Physics S1

Newtonian Physics

Physics S2

Electromagetic Spectra

Every day <u>each</u> <u>group</u> will need:

- **One physics textbook**
- **One computer**

Each activity includes:

WDYS

WDYT

Investigate

Physics Talk

Checking up

Physics to Go

Chapter 1: Driving the Roads

Chapter Challenge

10 pts - 2-3 min. talking (<2 min or >5 min, ea. 1 min -1 pts)
30 pts - relationship bet. braking distance, following distance, & total stopping distance, & factors that affect each
30 - connections between speed, friction, & radius of curve when turning
20 pts - graphs, charts, or posters (10 pts each req'd, +5 pts add.) (2 req'd)
10 pts - written report
24 pts - oral presentation score
124 pts

Section 1: Responding to Road Hazards (p. 8)

10/25/16

WDYS Mountains, one car atop another, car braking hard its driver's hat flew off, mountain road (curve), rabbit, car fluids leaking, bunny watching, blue car dude scared, yellow on top of red car, nice day, likely speeding, not enough space, possible crossed the center line, likely fatality

WDYT Speed, space between cars, excessive speed, animals on the road, driver skill, shape of the road (curves), other drivers, quality of your brakes, attention on other things, weather (sun in eyes), passengers, condition of automobile, DUI/DWI, vision impairment

I will use multiple methods to measure and describe reaction time.

Section 1: Responding to Road Hazards (p. 8)

- I will use multiple methods to measure and describe reaction time.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 1: Responding to Road Hazards (p. 8)

Investigate:

Method B (10 min)

Reaction Time with Distractions (10 min)

0.18 s
0.15 s
+ 0.19 s
0.52 s / 3
= 0.18 s
AVG

0.14 s
0.15 s
+ 0.23 s
0.52 / 3
= 0.18 s
AVG

I will use multiple methods to measure and describe reaction time.

Physics Talk (p.12)

Reaction time and distractions

Distractions slow your reaction time
Expecting events to occur improves reaction time

Other factors affecting reaction time

drugs, alcohol, gender, experience, fatigue, exercise, general attentiveness, personality, age

I will use multiple methods to measure and describe reaction time.

Exit ticket: Physics to Go #4 (p.19), #7 & 8 (p.20)

Answer in a full sentence.

Section 3: Average Speed: Following Distance and Models of Motion (p. 34) 10/31/16

WDYS I see three cars all squished together and none of the people in the cars look terrified. On the other side the two cars are driving more careful. I see a view of some type of lake with mountains in the back. In front I see two lanes, in one lane I see a van with a mom and three kids inside, and behind her at a good distance is a red car that's being driven by a woman. In the other lanes I see three cars, a blue car with a lady and baby, a red car with a lady and a man, and finally a yellow car with a lady and a dog. They seem very close together.

WDYT I believe that a safe following distance between two cars should be the distance of another car. Like in the other lane of the picture, the two cars seem to be very far apart so if the van in front were to break hard, the car in the back wouldn't have to because she would have enough space and time to break normally.the way i would decide a safe distance for me would amount of time it would take me to stop my car when needed

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion

10/31/16

- I will use multiple methods to measure and describe speed
- Define and contrast average speed and instantaneous speed
- Create and interpret graphs to understand and calculate speed.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
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Section 3: Average Speed: Following Distance and Models of Motion

Investigate (p. 34)
#1-3 in groups
#4-6 whole class
#7-8 groups

$$\frac{ft}{s} * (s) = ft$$

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion Physics Talk (pp. 37-46)

Speed is a factor in braking distance, following distance, and total stopping distance

Speed is the distance travelled per unit time.

Constant speed is speed that does not change over a period of time

One way to show motion is with the use of strobe photos.

The average speed of a vehicle is the ratio of the distance travelled to the time taken

$$\text{average speed} = \frac{\text{distance traveled}}{\text{time elapsed}} \qquad v_{AV} = \frac{\Delta d}{\Delta t}$$

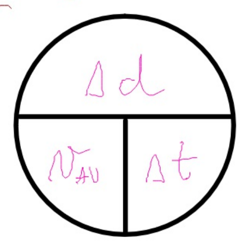
I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion Physics Talk (pp. 37-46)

(m) = meter (V) = Volts

instantaneous speed is the speed at a given moment
- speed shown on the speedometer

$$v_{AV} = \frac{\Delta d}{\Delta t} \qquad \Delta d = v_{AV}\Delta t \qquad \Delta t = \frac{\Delta d}{v_{AV}}$$



$$v_{AV}\left(\frac{m}{s}\right) = \frac{\Delta d\,(m)}{\Delta t\,(s)}$$

$$\Delta t\,(s) = \frac{\Delta d}{v_{AV}} \qquad \frac{150\,ft}{60\,ft/s} = 2.5\,s$$

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion Physics Talk (pp. 37-46)

Velocity is speed in a given direction, it always contains both parts

mi/h · 1.46 ~ ft/s   1 km ~ 0.62 mi

m/s · 3.9 ~ km/h

Doppler effect - the change in position of the sound relative to the listener changes the pitch of the sound; as distance decreases the pitch increases, and as the distance increases the pitch decreases

Reaction distance - the distance the car travels before you react to a situation

I will use multiple methods to measure and describe speed, define and contrast average speed and instantaneous speed, and create and interpret graphs to understand and calculate speed.

Section 3: Average Speed: Following Distance and Models of Motion

CU   Checking Up: #1-4 (p.46)

PtG   Physics to Go: #4-7, 12 (pp.49-50)

Section 4: Graphing Motion: Distance, Velocity, and Acceleration p.52 11/08/16

WDYS I see a man speeding in his red car and a man with his dog crossing the street, i also see a lady look surprised The yellow car is just doing it thing not minding anything going at the speed, she has a cat in the vehicle. One guy is scared and running with its dog across the road because of the red car speeding. The old lady by the garage she looks confused. In the back there's a beach.

WDYT A similarity would be that they started and stopped at the same speed. A difference could be that the car probably got to that speed quicker than the bus did, because the car weighs much less than a bus. Making it easier for the car to move and speed up faster than the bus.

Section 4: Graphing Motion: Distance, Velocity, and Acceleration 2/01/16

IWBAT

- Define acceleration using words and an equation;
- Calculate speed, distance, and time using this equation
- Interpret distance-time and velocity-time graphs for different types of motion.

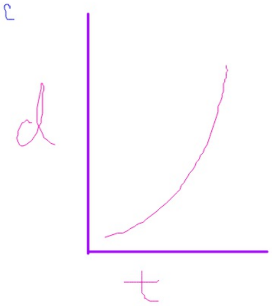
Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 4: Graphing Motion: Distance, Velocity, and Acceleration

Investigate: (p. 52)

1. c



IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

Section 4: Graphing Motion: Distance, Velocity, and Acceleration

Physics Talk (p.58)

acceleration - the change in velocity with respect to (over) time

vector - has both magnitude and direction

acceleration is a change in speed, direction, or both together

negative acceleration - slowing down, decreasing speed, accelerating in the opposite direction of travel

IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

Section 4: Graphing Motion: Distance, Velocity, and Acceleration

Physics Talk (p.58)

Constant motion
no acceleration

faster, positive acc.

slower, negative acc

$$\text{acceleration} = \frac{\text{change in } v}{\text{change in } t} = \frac{\Delta v}{\Delta t} = a$$

$$a = \frac{\Delta v}{\Delta t} = \frac{m/s}{s} \quad a\ (m/s/s \text{ or } m/s^2)$$

IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

Section 4: Graphing Motion: Distance, Velocity, and Acceleration

"Acceleration is the change of speed."

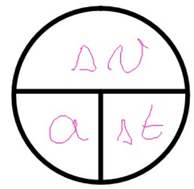
1. What is correct about this?
2. What can be improved?

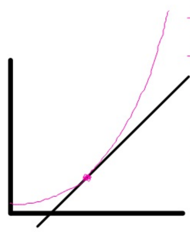
Section 4: Graphing Motion: Distance, Velocity, and Acceleration

Physics Talk (p.58)

$\Delta v = a \Delta t$

$\Delta t = \frac{\Delta v}{a}$

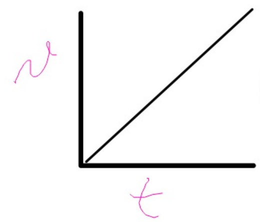




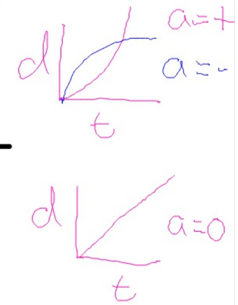
tangent line touches the curve at one spot;

dt graph slope = v;

vt graph slope = a



a = const.



Section 4: Graphing Motion: Distance, Velocity, and Acceleration

Checking up (p.64) #1-3

Physics to Go (p.68) #7, 9, 17

$$a = \frac{v_f - v_i}{\Delta t}$$

$$v_{av} = \frac{\Delta d}{\Delta t}$$

After conversing with one partner, answer the What Do You Think Now on pg. 66 and record your answer in the appropriate place on your WDYS document.

IWBAT define acceleration using words and an equation; calculate speed, distance, and time using this equation; and interpret distance-time and velocity-time graphs for different types of motion.

Units

11/15/16

Mini-challenge (p. 72)
(40 min.)

Look over the requirements for the chapter challenge. As a team, write a paragraph for your challenge relating to the topics covered in sections one, three, and four.

With the remaining time of the 40 minutes, make sure you have updated your individual physics vocabulary resource for the first seven words listed for chapter 1 and any additional new words of which you wish to keep track.

Section 5: Negative Acceleration: Braking Your Automobile

p.75

11/15/16

WDYS the car almost hitting the moose, the car is pushing on the break's really hard, the moose is just staring at the frightened man I see a moose, a red car, trees, a scared driver that is going way too fast, and paper flying behind the carThe guy is in the wood and they should have "animal warnings" and so they have to be cautious and drive carefully because the animals can be wherever they want. The moose in the picture can show that the car was going a little too fast on the road and he would have to slam of the brakes once it was to late he might be able to stop in time and he is going to hit the animal.

WDYT as soon as i see the animal i would take my foot of the accelerator and once i see it getting closer and closer i will start to press on the brake

Section 5: Negative Acceleration: Braking Your Automobile

p.75

I will

- Plan and carry out an experiment to relate braking distance to initial speed, determine braking distance
- Examine acceleration by seeing how varying the initial speed changes the braking distance.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 5: Negative Acceleration: Braking Your Automobile

Investigate p.75

your plan must include :

- **Materials needed**
- **individual jobs (how will things be accomplished ?)**

I will plan and carry out an experiment to relate braking distance to initial speed, determine braking distance, and examine acceleration by seeing how varying the initial speed changes the braking distance.

Section 5: Negative Acceleration: Braking Your Automobile

Physics Talk (p.78)

$$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i}$$

braking $v_f = 0$ $\quad a = \frac{0 - v_i}{\Delta t} = \frac{-v_i}{\Delta t}$

$$a = \frac{4-6}{1} = \frac{-2}{1} = -2 \text{ m/s/s}$$

←↑ ←↓ $a = \frac{-4+(+2)}{1} = \frac{-2}{1} = -2 \text{ m/s}^2$

$$a = \frac{-2+(+4)}{1} = \frac{2}{1} = 2 \text{ m/s}^2$$

I will plan and carry out an experiment to relate braking distance to initial speed, determine braking distance, and examine acceleration by seeing how varying the initial speed changes the braking distance.

Section 5: Negative Acceleration: Braking Your Automobile

Calculating Braking Distance

$$v_f^2 = 2ad + v_i^2$$

$$0\left(\frac{m}{s}\right)^2 = 2a\left(\frac{m}{s^2}\right)d(m) + v_i^2\left(\frac{m}{s}\right)^2$$

$$\frac{m}{s^2}\cdot\frac{m}{1} = \frac{m^2}{s^2}$$

$$0 = 2ad + v_i^2$$

$$-v_i^2 \qquad -v_i^2$$

$$\frac{-v_i^2}{2a} = \frac{2ad}{2a} \qquad a = \frac{-v_i^2}{d}$$

$$\frac{-v_i^2}{2a} = d$$

$$\frac{-v_i^2}{2a \mid d}$$

$$1.98\ km/h \cdot 1000\frac{m}{km}\cdot\frac{1}{60}\frac{min}{s}$$

$$1.98\ km/h\left(\frac{1000}{3600}\right)\frac{m}{s} \qquad \frac{1}{60}\frac{h}{min}$$

$$\frac{1980}{3600} = 0.55\ m/s$$

$$a = \frac{-(0.55)^2}{11.64m} = -0.0259\frac{m}{s^2}$$

Section 5: Negative Acceleration: Braking Your Automobile

Calculating Braking Distance

$$\frac{-v_i^2}{2a \mid d}$$

6.87km/h 3.99m

$$6.87\frac{km}{h}\left(\frac{1000}{3600}\right) = \frac{68.7}{36} \qquad \frac{m}{s} = 1.91\frac{m}{s}$$

$$\frac{-v_i^2}{2d} = a = \frac{-(1.91\frac{m}{s})^2}{(2(3.99m))} = -0.46\frac{m}{s^2}$$

d (m)
t (s)
$a\left(\frac{m}{s^2}\right)$
$v\left(\frac{m}{s}\right)$

8.63km/h
5.05meters

$$8.63\left(\frac{10}{36}\right) = 2.40\frac{m}{s}$$

$$a = \frac{-(2.40)^2}{2(5.05)} = -0.24\ m/s^2$$

Section 5: Negative Acceleration: Braking Your Automobile

Checking up (p.82) #1-3
WDYTN (p.86)
Physics to Go (p.88) #2, 4, & 11

I will plan and carry out an experiment to relate braking distance to initial speed, determine braking distance, and examine acceleration by seeing how varying the initial speed changes the braking distance.

Section 7: Centripetal Force: Driving on Curves

p.105

11/29/16

WDYS There's a car going too fast and it looks like it's going off road. I see a red car nearly falling off a very curved road, smoke coming from the car because of the speeding, some cars ahead in traffic because they are going the speed limit I see a red car, a road on the cliff, a sign that was hit off the road down the cliff, three other cars that are blue, green, and red. There is also a boulder that looks like it is falling down the mountain on to the road.

WDYT The sign is indicating the drivers to slow down because the mountain seems to have crazy turns, and if the driver is driving fast while turning, chances are they can probably drive off the road, especially since it is so small.I believe the amount to slow down is determined by being able to drive through the sharp curves smoothly, without any troubles. The sign is indicating to slow down because if the driver on the road is going too fast, they can get hurt and drive off road down the mountain. Also to slow down because if they are driving too fast,, a bolder could come flying down the mountain and the driver may not be able to stop fast enough then be hit,

Section 7: Centripetal Force

IWBAT

- Recognize the need for centripetal force when rounding a curve
- Predict the effect of inadequate centripetal force
- Relate speed to centripetal force.

Via

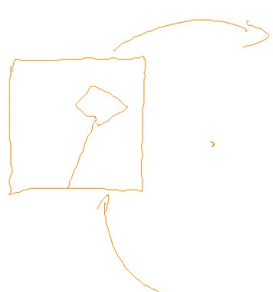
- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 7: Centripetal Force

Investigate (p. 105)

There are three stations.

- Turntable
- Car on string
- Cork accelerometer



IWBAT recognize the need for centripetal force when rounding a curve, predict the effect of inadequate centripetal force, and relate speed to centripetal force.

Section 7: Centripetal Force

Physics Talk (p.109)

Centripetal force – pulls/pushes toward the center of the curve

car – string, block – friction

reduce friction – ice, water, sand, dirt, mud, gravel, grass

Centripetal acceleration – acceleration due to a change in direction

IWBAT recognize the need for centripetal force when rounding a curve, predict the effect of inadequate centripetal force, and relate speed to centripetal force.

Section 7: Centripetal Force

Checking Up (p. 110) #1-3, 6
Physics to Go (pp. 114-115) #3, 4, 7, 9, 12, 13
WDYTN (p. 112)

IWBAT recognize the need for centripetal force when rounding a curve, predict the effect of inadequate centripetal force, and relate speed to centripetal force.

Chapter 1: Driving the Roads

Chapter Challenge (pp. 118-121)

Chapter 1: Driving the Roads

Due Friday, 12/2/16

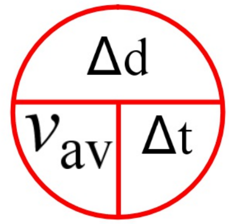
- Chapter Challenge presentation (team)
- Chapter 1 vocabulary (individual)
- Chapter 1 WDYS/WDYT (individual)
- Chapter 1 notebook (team)

Chapter 1: Driving the Roads

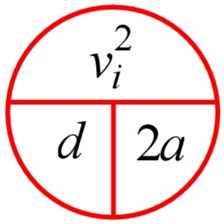
12/02/16

$$v_{av} = \frac{(v_1 + v_2)}{2}$$

$$v_{av} = \frac{\Delta d}{\Delta t}$$



$$d = \frac{v_i^2}{2a}$$



$$a = \frac{\Delta v}{\Delta t}$$